



## FACT SHEET #2

## HOME WELL WATER QUALITY

### Why Should I Be Concerned?

Most people living in rural areas with limited industry expect their home well water quality to be excellent. When buying a home, many people take for granted that their water will be clear and safe to drink. Yet, in many areas of Maine, poor water quality is common. High levels of iron, manganese, and other naturally occurring metals can make the water unusable without costly treatment. Many other contaminants, some of which are introduced by human activity and others that occur naturally, can cause significant health problems. The bottom line is that your health, your family's health, and the value of your home all depend on a safe, high quality water supply.

### Why Should I Know More about Ground Water and My Well?

As a homeowner, you should understand the basics of ground water: what it is, how it moves, and how it may become contaminated. Also, it is very important to know how to test the quality of your water to be sure it is safe. By understanding these concepts, you will learn how **your activities and those of your neighbors** could impact **your** well.

**The purpose of this fact sheet is to improve your understanding of ground water and well construction so you can protect the safety of your water supply.**

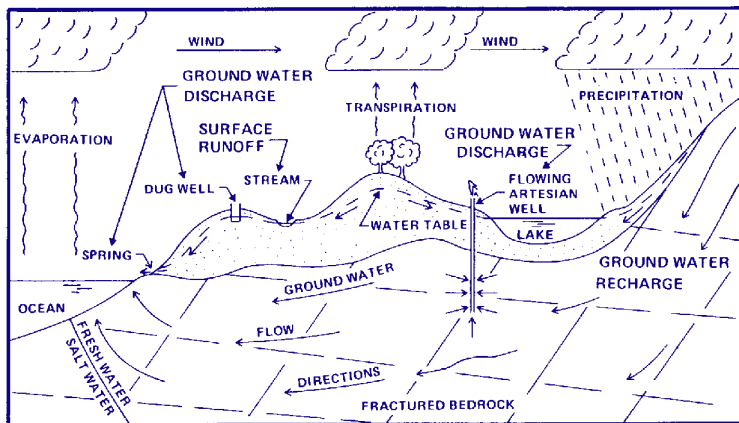
### Ground Water: What Is It and What Affects its Quality?

The amount of water on earth is constant, but water is always changing from one form to another. This process is called the hydrologic cycle. Water falls on land as rain, snow or ice. Some of the water is used by plants, some evaporates back into the atmosphere, and a portion moves below the root zone to resupply ground water.

*A joint water quality project from:*



Ground water is found beneath the land's surface. Most ground water used for drinking is taken from fractured bedrock or sand and gravel deposits. Contrary to popular belief, ground water is rarely found in underground rivers or lakes. Ground water tends to move



more like water soaking through a sponge than water flowing down a river. Ground water moves slowly from areas of higher elevation to areas of lower elevation. In the eastern United States, about 70 percent of the flow of perennial streams comes from ground water discharge. The volume of ground water in an area changes seasonally and varies from year to year, depending upon the amount of precipitation and how much water is removed by plants.

Source: *Groundwater Handbook for the State of Maine - Bulletin 39.*

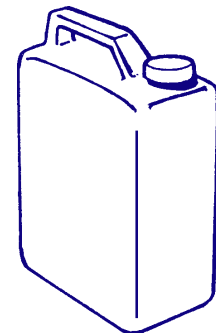
**The water you drink probably entered the ground less than a mile from your well. So, the activities near your own home can have a major impact on your well.** For instance, petroleum leaking from a home heating oil tank may percolate down to the top of the water table. Once there, the oil will flow with the ground water. If your well is in the path of the flow, you may find petroleum in your water supply.

## Well Location

The location of your well is one of the most crucial safety factors to consider. Locating a well in a safe place takes careful planning and consideration of factors such as surface drainage and ground water flow. Placing a well close to or downhill from a road could lead to road salt contamination. Locating a well downhill from a livestock yard or a septic system could easily lead to bacterial contamination. The minimum distance between a well and a septic system should be 150 feet, but longer distances would better protect the well. In short, attempt to locate your well as far away from potential hazards as possible. Also, once the well is established, keep any harmful activities far away from the well.

**Keep the following potential hazards in mind when siting a well:**

- 💧 **Storage sheds/garages containing petroleum, pesticides, or hazardous materials**
- 💧 **Underground storage tanks**
- 💧 **Roads**
- 💧 **Gardens**
- 💧 **Septic systems**



Changing the location of your well in relation to potential hazards may protect your well but not the ground water itself. If your activities impact a neighbor's well, you could be held responsible. Any conditions or practices likely to cause ground water contamination should be changed, even if your own well is far away from the source. **Contaminating ground water is a violation of Maine law.**

## Pros and Cons of Dug and Drilled Wells

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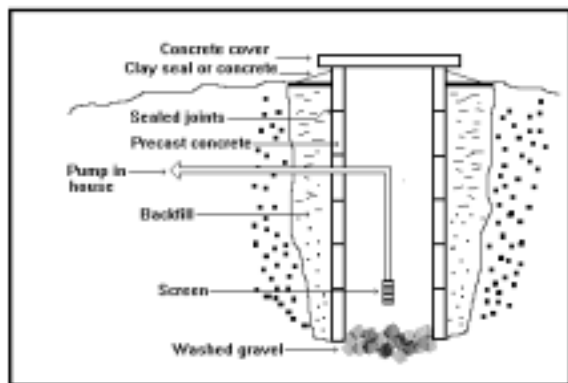
If you are considering putting in a new well, it will probably be either a dug or a drilled well. There are definite advantages and disadvantages to each type of well. A dug well is not recommended as the sole source of water for a permanent residence. However, dug wells are often used in camps or seasonal homes. They are best adapted to coastal areas where salt water could impact a drilled well, or where bedrock contains so much iron or manganese that the water is not potable without water treatment. One major disadvantage of dug wells is that during drought they may go dry. Also, there is a greater chance of bacterial contamination in dug wells than in drilled wells. Because dug wells are shallow, there may not be enough separation between surface sources of contamination and the water supplying the well. Surface water may even enter the well directly by flowing past the well cover or down the side of the well.

Drilled wells are generally safer than dug wells because the water supplying drilled wells is more protected from human activity. These wells are drilled or pounded through the soil into ledge. However, the safety of any well depends on location, proper wellhead design and minimization of threats to the ground water.

## Safe Dug Well Installation

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A contractor or a homeowner can install a dug well. However, an improper design can allow contaminants to enter the well. A backhoe should be used to dig a hole 15 to 20 feet deep. A foot of washed gravel or crushed rock should be placed in the bottom of the hole. Then



concrete tiles should be stacked in the hole so the top tile is at least 18 inches above the ground. To ensure that water flows through the soil before entering the well, grout should be used to seal the joints between the tiles. The goal is to get the water to flow into the well through the bottom of the hole, and from nowhere else. When backfilling around the well, build the soil up around the wellhead to ensure that surface water flows away from the top of the well. Finally, a concrete cover (not wooden!) is necessary to prevent bacterial buildup in the well, and to keep out animals and debris.

## Common Problems and Troubleshooting: Dug Wells

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- 💧 **Bacterial contamination:** If your well water is contaminated with bacteria, shock-chlorinate the well (See Water Quality Fact Sheets #26 and #27 (Bulletins #7114 and #7115) from the University of Maine Cooperative Extension). The cause may be dislodged well tiles or a leaky cover. If necessary, realign and regROUT the tiles or replace the cover.

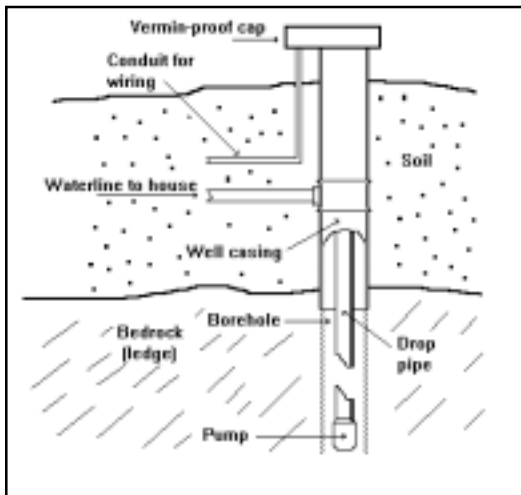
- 💧 Odor problems: If your well water develops a stale, musty, or rotten egg odor, it may be the result of iron bacteria. These are not harmful, but they can make the water most unpleasant. Again, shock-chlorination may eliminate the problem.
- 💧 Water quantity problems: Many dug well owners see a decline in well water quantity during the summer or in periods of drought. Aside from digging the well deeper, there is little you can do. However, practicing water conservation methods can stretch the water supply. For more information on these methods contact your county office of the University of Maine Cooperative Extension.

## Safe Drilled Well Installation

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While it is not likely that you will ever drill your own well, knowing how a well is built and how to inspect your well can be helpful. If your well was drilled after 1985, it is likely that the Maine Geological Survey has a record on the construction of your well if you need one.

Well drillers place steel or plastic pipe, called casing, into the borehole to keep the soil from collapsing as they drill toward the ledge. The casing normally extends two or three feet above the soil surface to prevent surface water from ponding on the top of the well. The base of the casing is usually pounded into the ledge at least 10 feet. Frost or human activity can sometimes dislodge the casing. Any spaces between the casing and the sides of the hole



provide a direct channel for surface water to reach the water table, leading to water quality problems. To avoid this, drillers seal the area around the top of the casing with bentonite clay or concrete. The well is chlorinated after drilling to ensure the water is safe to drink. You can inspect your casing to see that it is sound. Shine a light down the casing to see that there are no holes. Also shake the casing to make sure that it is not loose. Make sure the well casing has a tight fitting, vermin-proof cap. Well wiring should be in a conduit, and be sure that if your well is vented, the vent hole faces the ground and is screened to prevent insects from entering the well.

## Common Problems and Troubleshooting: Drilled Wells

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- 💧 Red or blackish staining in sinks or clothes: Test your water for iron and manganese. The stains are likely the result of high concentrations of these metals. Contact your county office of the University of Maine Cooperative Extension for water treatment options.
- 💧 Green staining in sinks: Low pH (acidic) water will leach copper from copper water pipes. Increasing the pH of the water will decrease the ability of the water to leach copper.

- 💧 Water quantity: Some wells can be hydrofractured to increase yield. In hydrofracturing, the driller blasts water into the well casing with the hope of increasing the size of fractures in the rock. Also, water conservation practices can be used to stretch limited water supplies.
- 💧 Excessive sediment: Sometimes the well casing will become dislodged from the bedrock. This allows soil to flow into the well between the casing and the bedrock. Either pounding the casing back into the bedrock or installing a seal inside the casing should solve the problem.

## Managing and Maintaining Existing Wells

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Like everything else you own, a well requires some maintenance. Regular water testing, keeping the well area clean and accessible, and having a driller or pump installer periodically check the well all make sense. It is a good idea to test your well water quality every three to five years. Contact the Maine Health and Environmental Testing Lab at (207) 287-2727 or a private water testing service to request a test kit. Ask for a test that will show whether the water is free from bacteria, and whether iron, manganese, chloride, fluoride, pH, hardness, nitrate, and nitrite are at safe levels. Other water tests are available to detect specific metals. For instance, arsenic has been a problem in some areas of Maine. Sampling water for lead is important if your home has lead-soldered copper pipe or your home was built between 1975 and 1985.

If you notice changes in the color, taste or odor of your water, you should have it tested. Such changes may be the only sign that your water has gone bad. Test water more often if someone in the house is frequently ill (particularly stomach distress), and test for lead if there is a child or a pregnant woman in the home.

## New Wells

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A well that provides a safe and sufficient supply of water will greatly improve the value of your home. Keep in mind these basic principles when drilling or digging a new well:

- 💧 Locate your well on ground higher than sources of potential pollution.
- 💧 Build up soil around the well casing to divert water away from the well.
- 💧 Avoid areas prone to flooding.
- 💧 Make sure the well is properly disinfected after construction.
- 💧 Have abandoned wells closed properly.

For more information, see the “Important Contacts for Information about Ground Water” information sheet included in this packet. Now proceed to the work sheet to check the safety of your well.

## Home Well Water Quality Worksheet

This worksheet will help you assess how your activities at home could impact your drinking water quality. A low risk means you have a safe well in a good location. A high risk does not mean that you have a problem with your ground water supply, but it does show that the conditions are right for a problem to develop. If any one category has a rank of three or higher, you should find a way to correct the situation. Contact someone on the reference sheet for help.

Choose the answers that best describe your situation.

Home Activities	High Risk (4)	Moderate-High Risk (3)	Low-Moderate Risk (2)	Low Risk (1)	Your Rank
<b>Type of Well</b>	Dug well, stone walls, wooden cover	Dug well, tiles installed, cement cover	Drilled well, under 250 feet deep	Drilled well, over 250 feet deep	
<b>Soils and Bedrock Geology</b>	Shallow sandy soils with several bedrock outcrops visible	Shallow, sandy soils with some bedrock visible	Deep soils, no bedrock visible	Deep, fine-textured soils, no bedrock visible	
<b>Well Placement</b>	Surface water ponds around well, or well is within 100 feet of pollution sources	Well located in a shallow depression, within 150 feet of pollution sources	Well located even-grade, and within 150 feet of pollution sources	Well located at least 150 feet up-slope from all pollution sources	
<b>Well Age</b>	Greater than 50 years old	Between 25 and 50 years old	Between 10 and 25 years old	Less than 10 years old	
<b>Water Testing</b>	Never tested, occasional odor and clarity problems	Never tested, water color and smell consistent	Not tested within 5 years, no history of problems	Tested frequently. No history of water quality problems	

